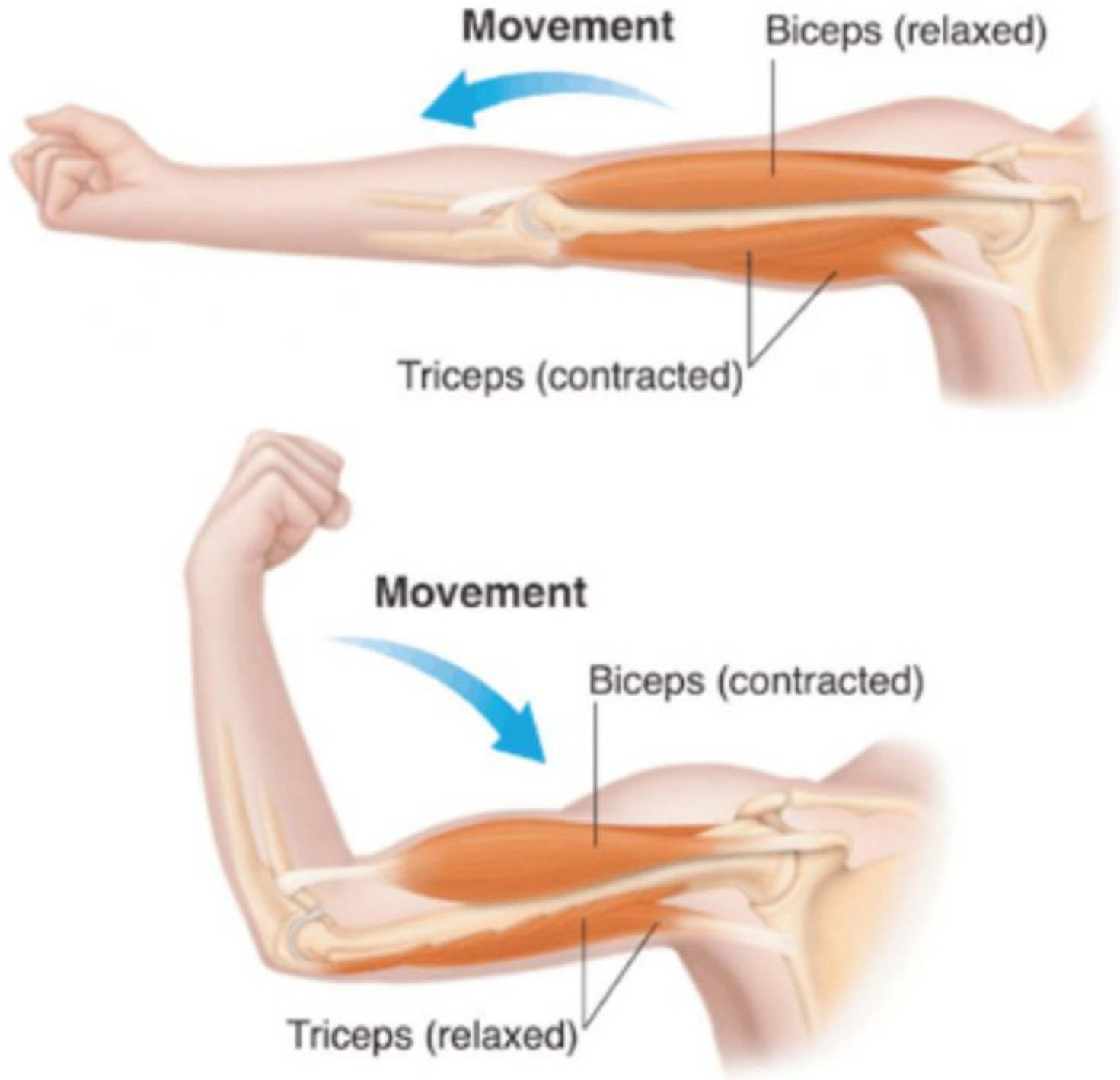
Movement 11.2



1. What is the function of the following;

-tendons

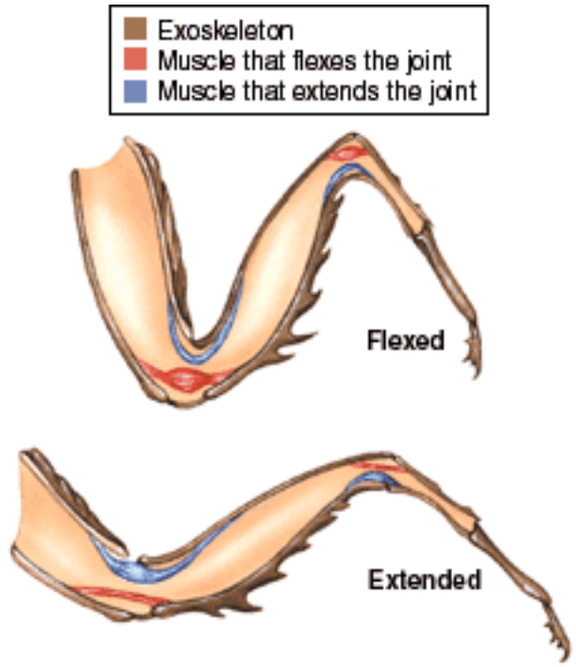
-bones

-extensors and flexors

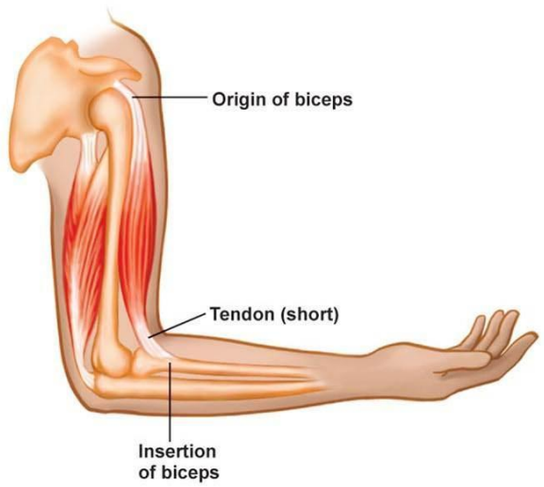
2. Give an example of a flexor, extensor, and bones that work together

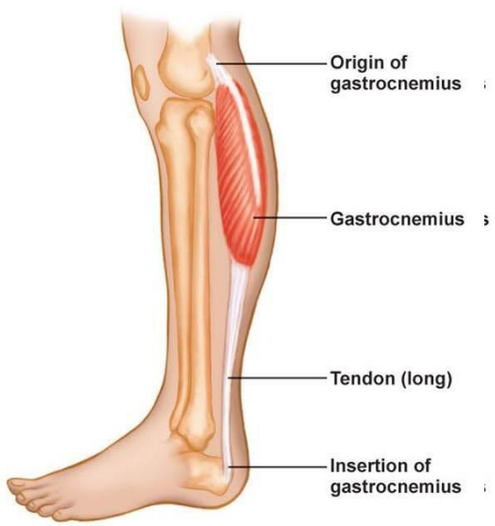
Bones and Exoskeletons

EXOSKELETON



ENDOSKELETON





Bones and Exoskeletons

Both

- facilitate movement acting as levers to change direction

- muscles do the pulling action or provide effort usually with opposing muscles (antagonistic pairs)

- joints act as fulcrums or places where pivoting action occurs

Joints

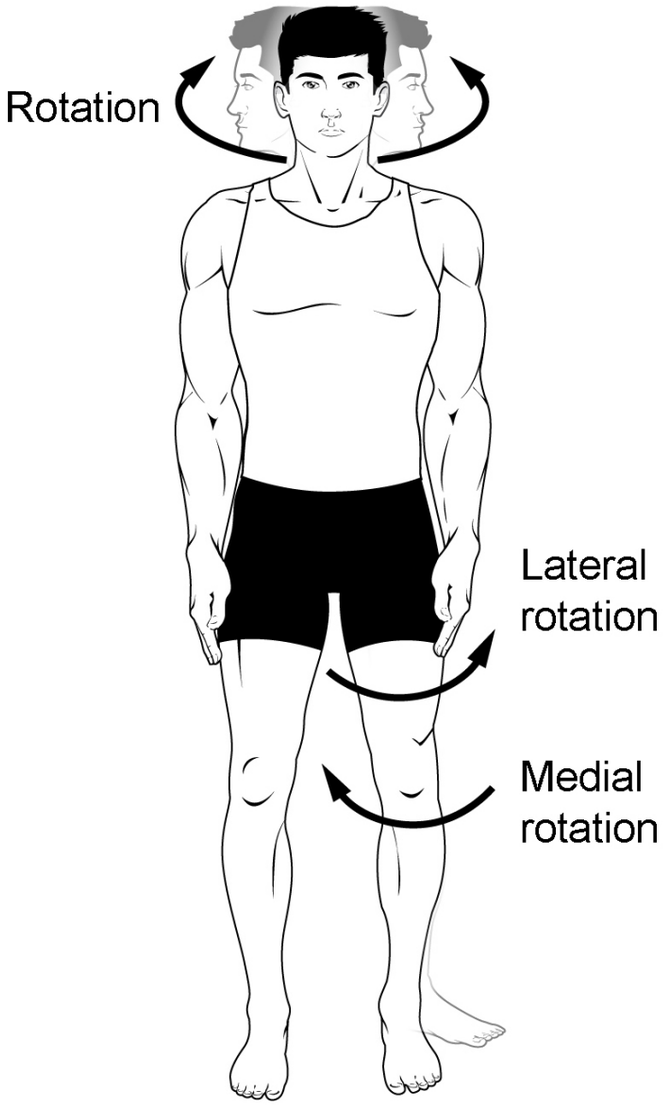
What do you remember about types of Joints?

What the difference between Flexion and Extension?

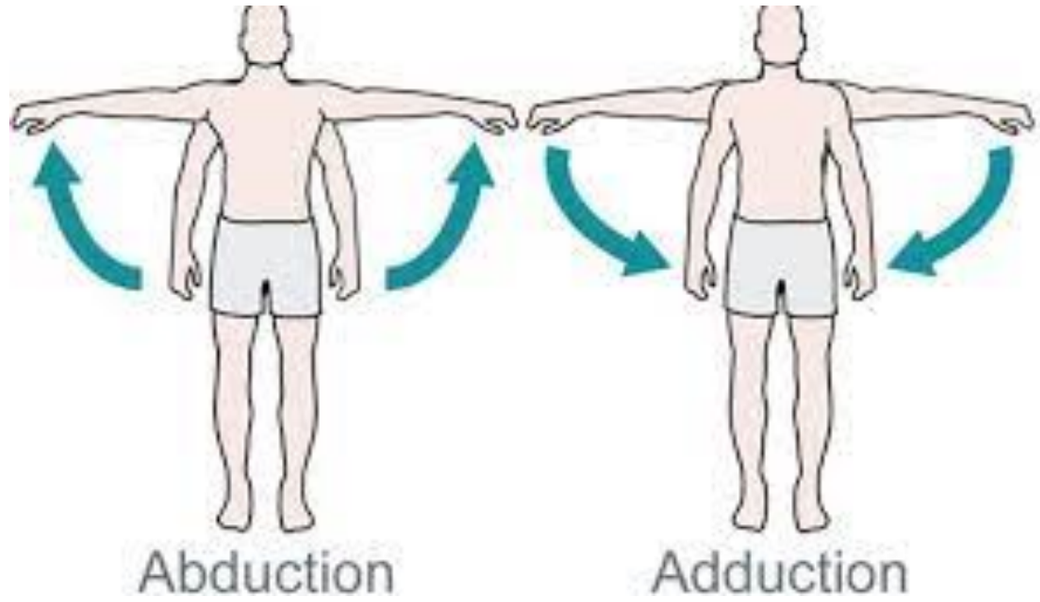
What the difference between Abduction and Adduction?

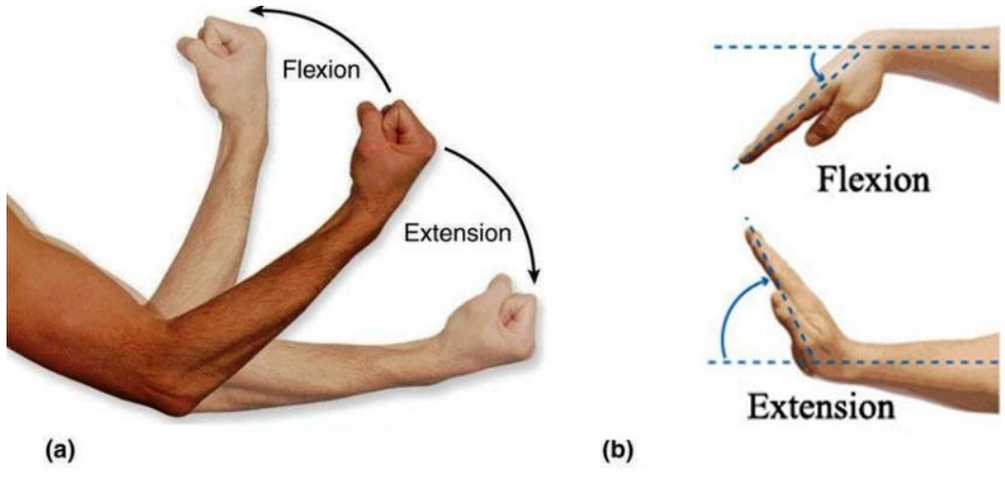
Outward Rotation? Inward Rotation?

Joints



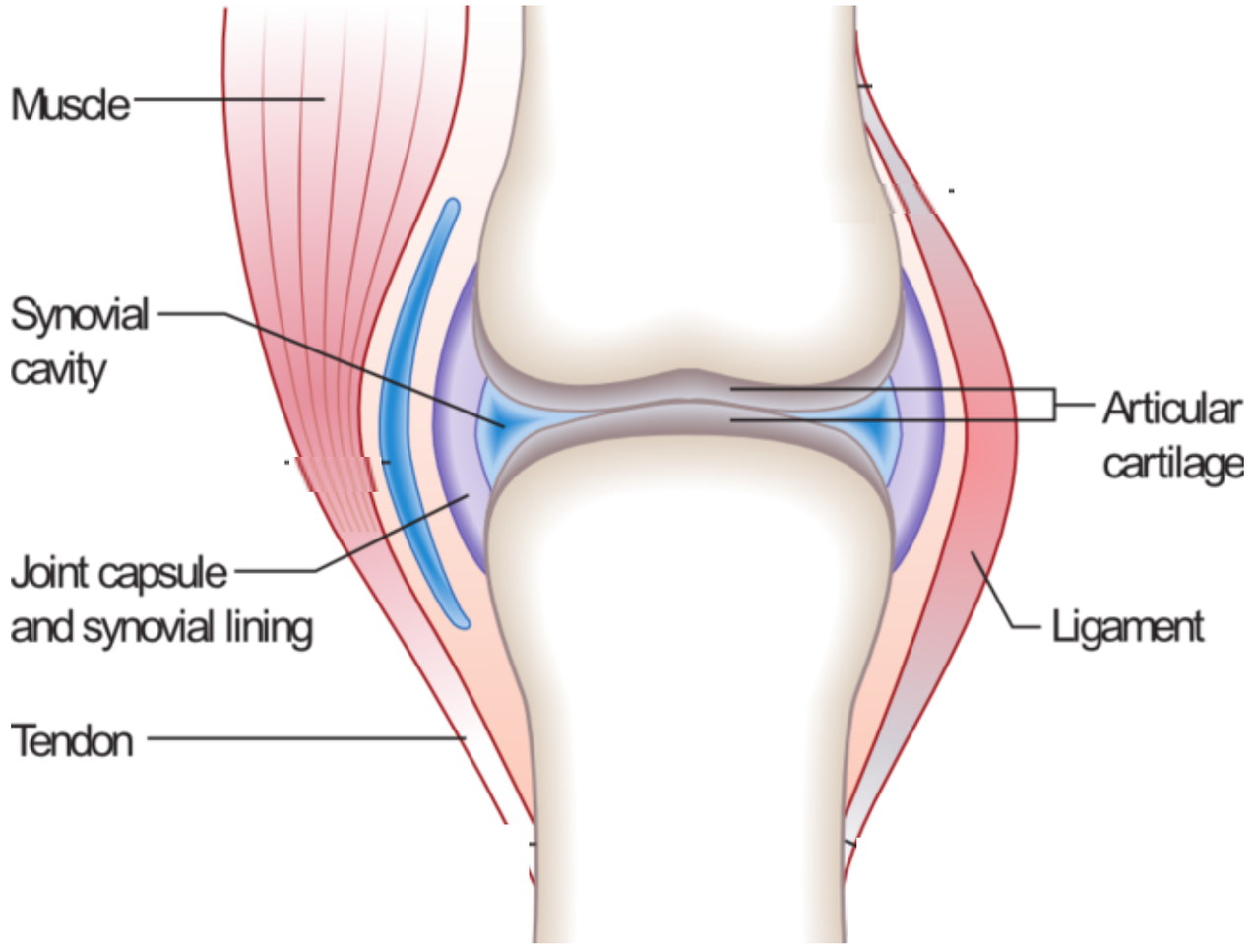
Rotation of the head, neck, and lower limb





Joint structure

- Cartilage - covering bone ends of joint to reduce friction
- synovial fluid - joint lubricant
- joint capsule - membrane that seals the synovial fluid in the joint
- Ligaments - connecting bones in the joint

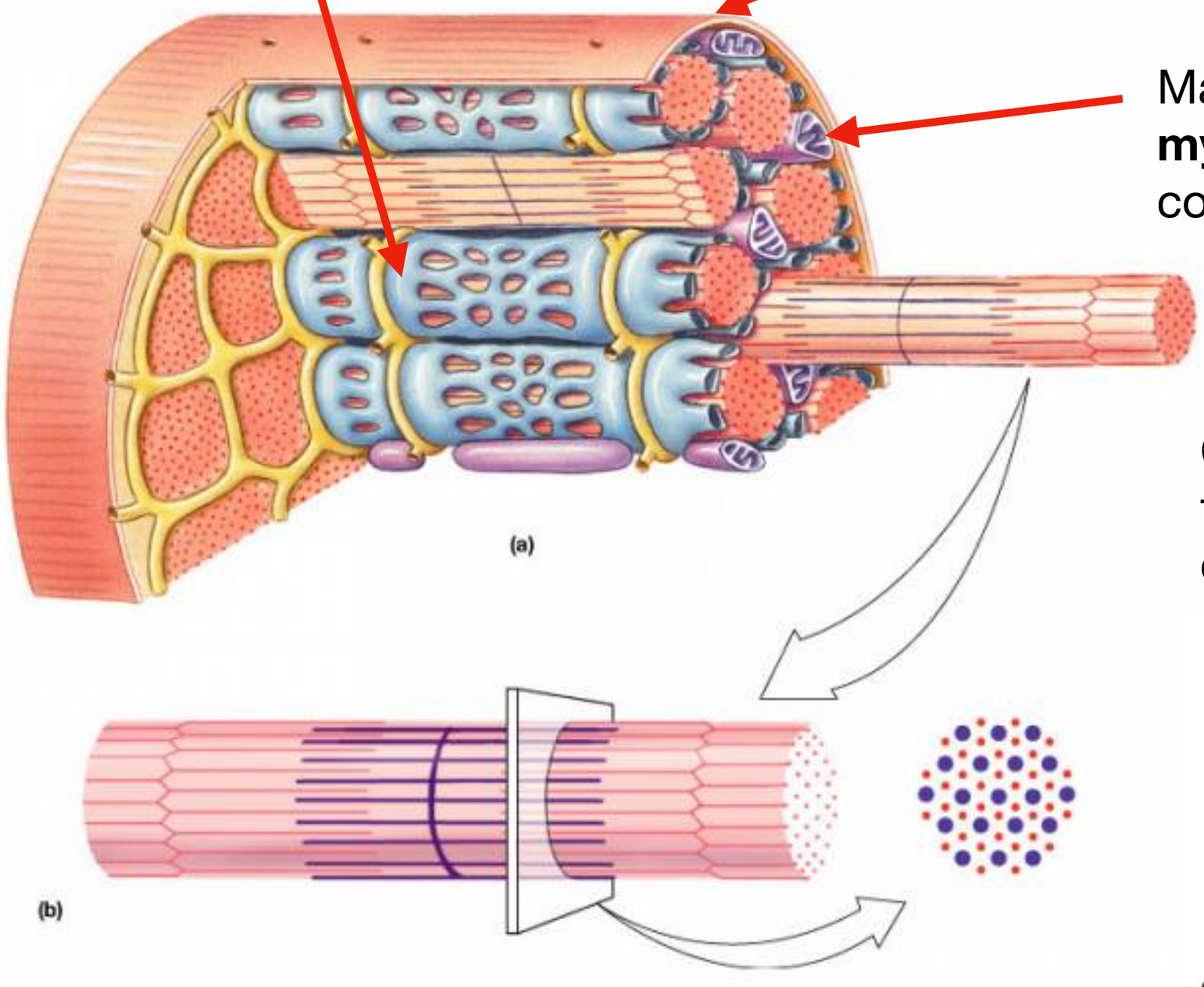


The Muscle Fibre Structure

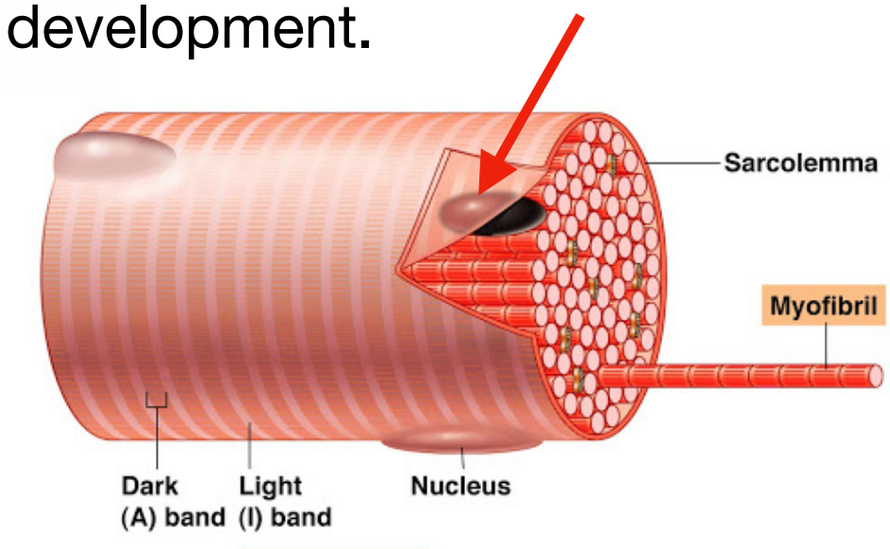
A specialized endoplasmic reticulum called a **sarcoplasmic reticulum** surrounds every **myofibril** and holds calciums ions. This provide an electrical transmission surface that holds calciums ions

Outer membrane plasma membrane **sarcolemma** raps up individual myocytes (**myofibrils**)

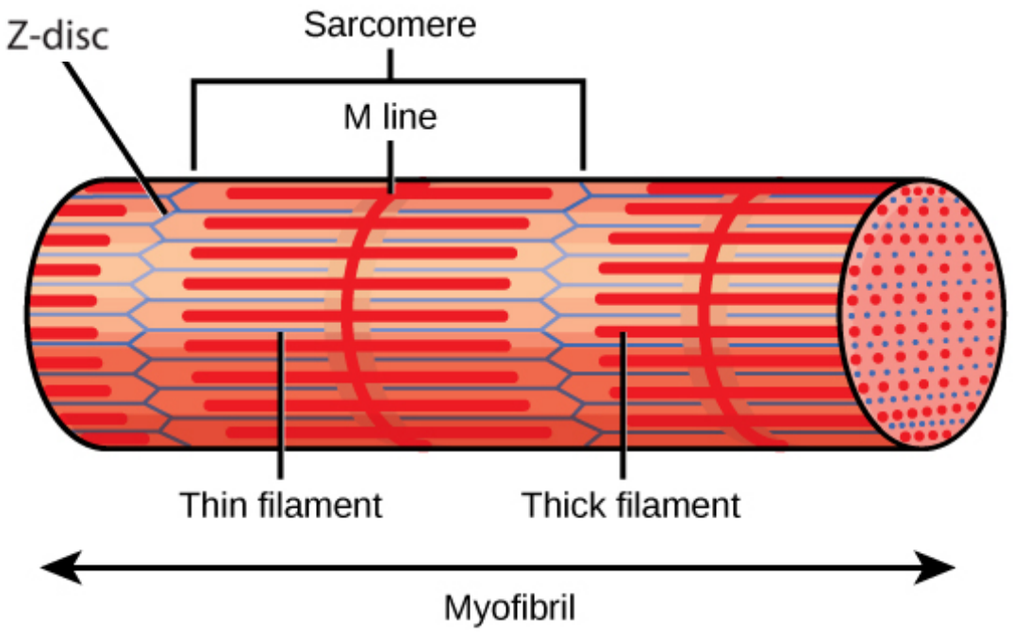
Many mitochondria surround **myofibrils** to provide energy for contraction.

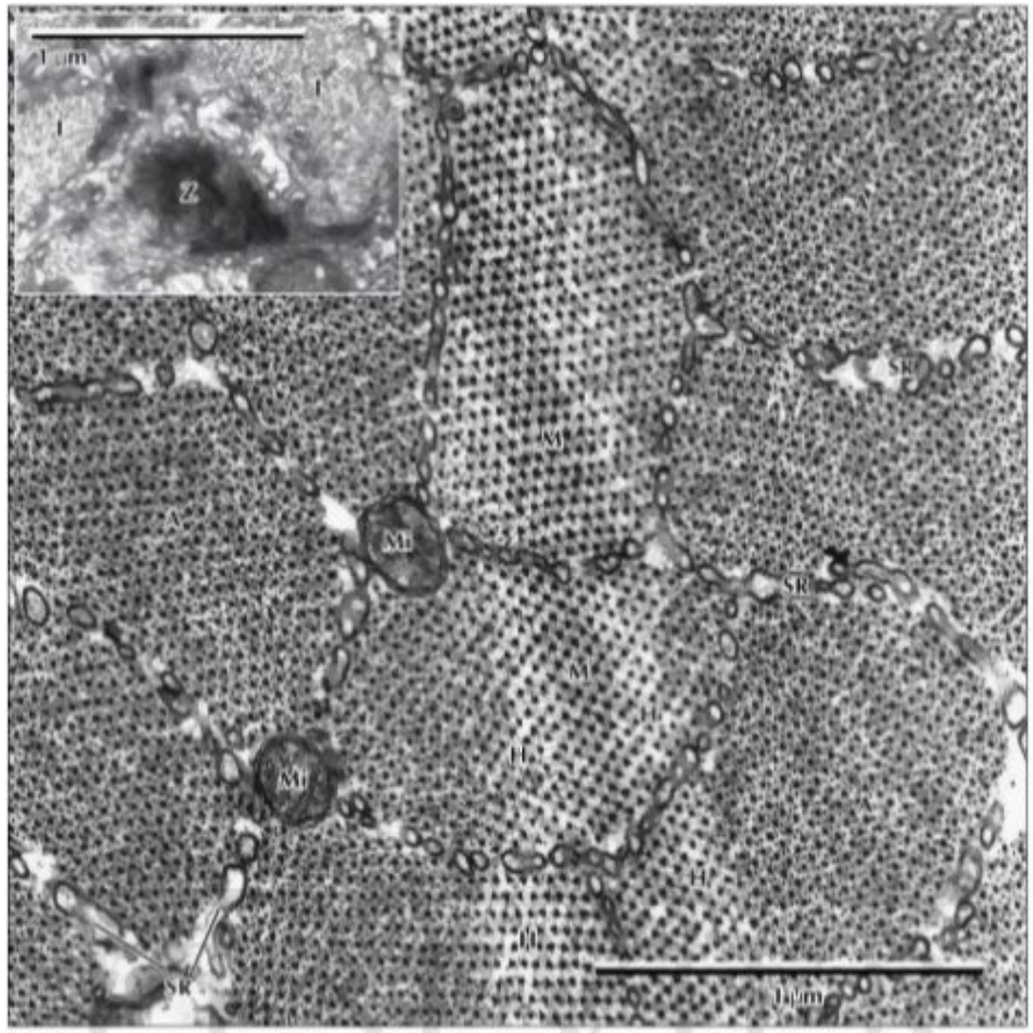


Cells are **multinucleate**, and are fused together during embryonic development.

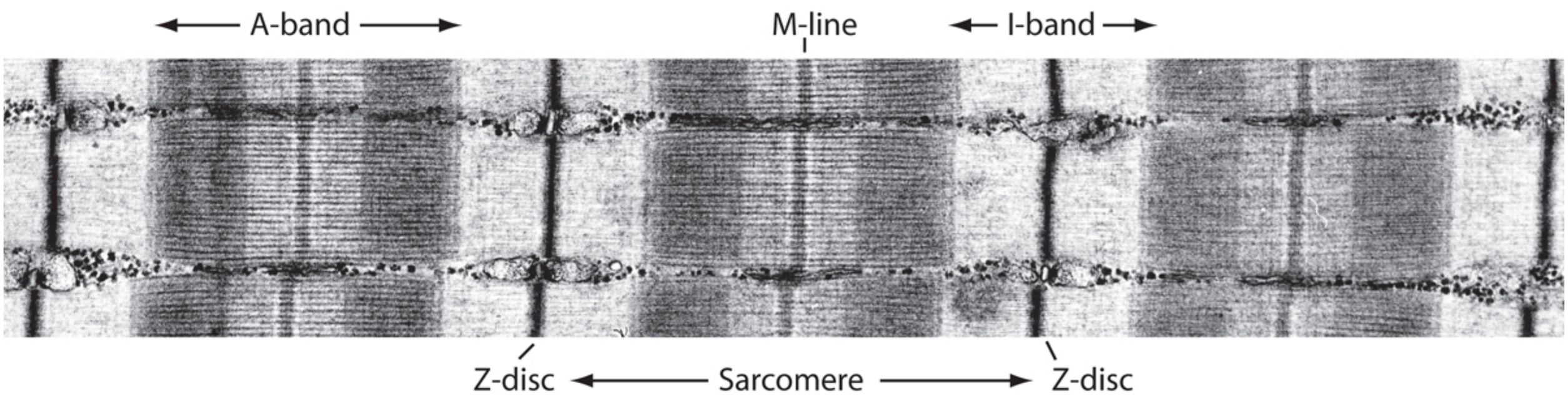


Myofibril Structure





Electron micrograph of part of a skeletal muscle fiber showing myofibrils in transverse section. Tubular components of the sarcoplasmic reticulum (**SR**) with intervening mitochondria (**Mi**) encircle myofibrils. The section passes through different parts of A bands of sarcomeres and shows an orderly arrangement of myofilaments in each region (**A**, the thick and thin filament overlap zone; **H**; **M**). 63,000×. The inset shows the square lattice pattern of the Z band (**Z**) and associated thin filaments in nearby I band (**I**). 45,000×.



SARCOMERE CONTRACTION revisited

- Actin protein fibres slides along myosin protein fibres toward the centre of the sarcomere to cause the contraction or shortening of the myofibrils

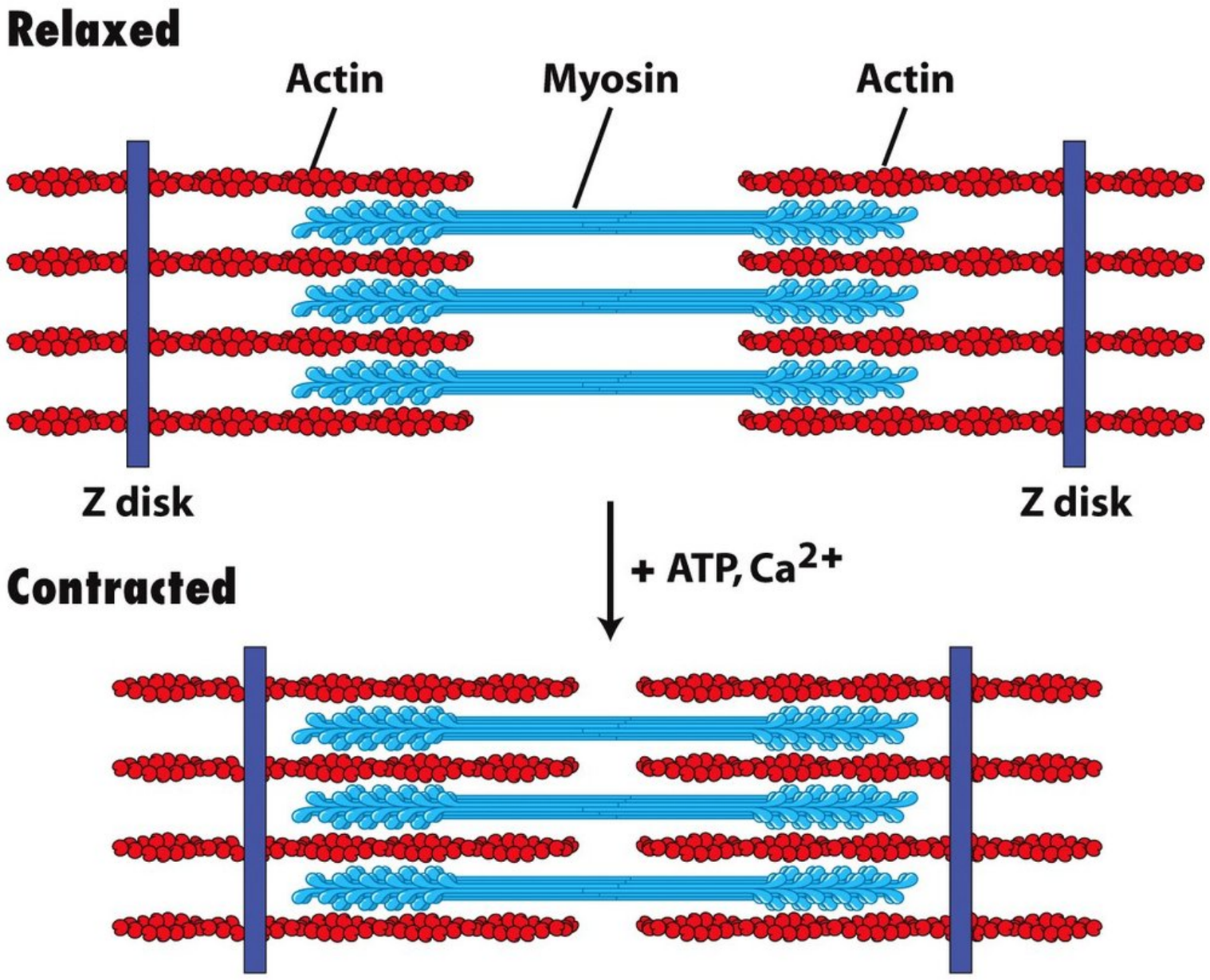


Figure 17-30
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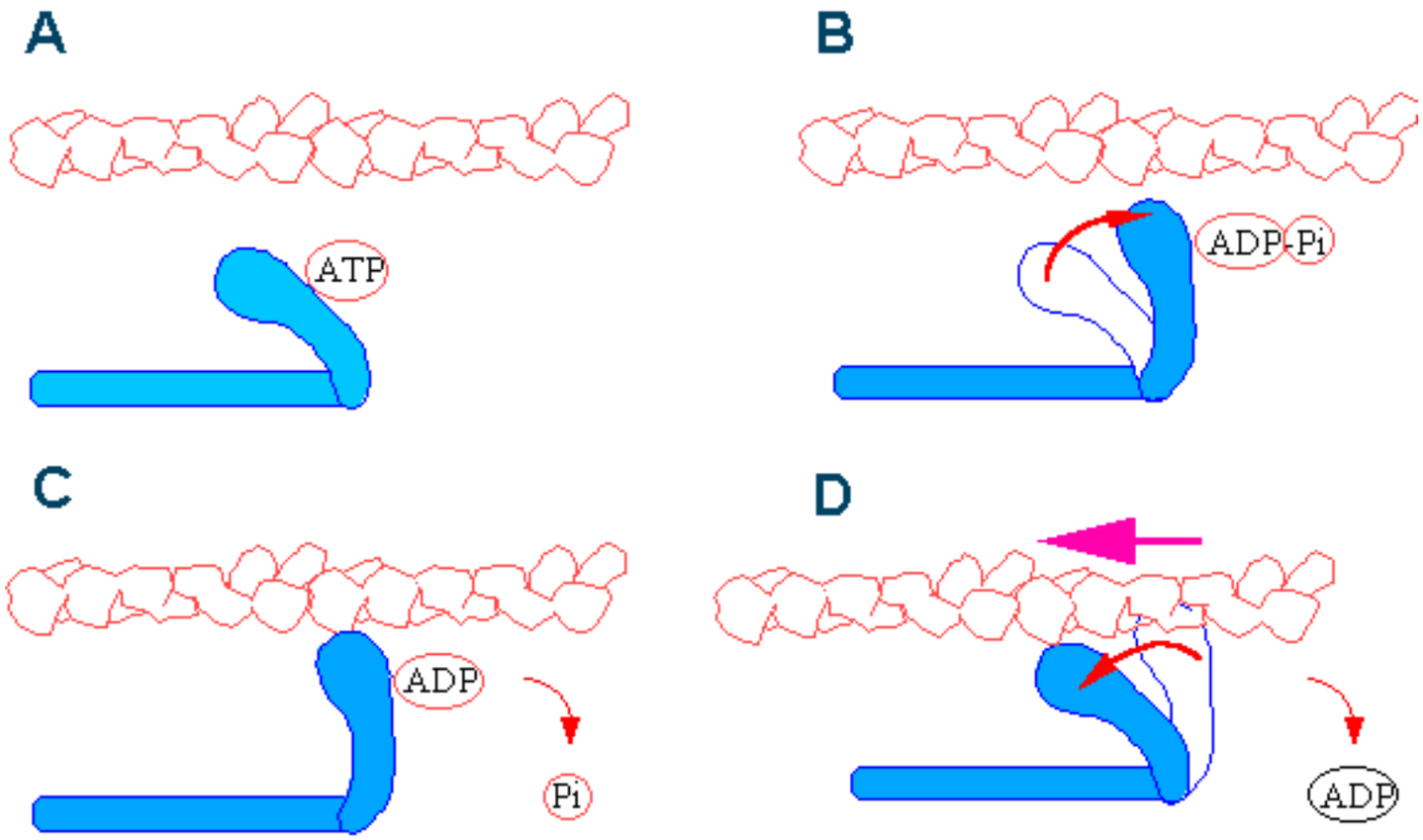
Myofibril Contraction Control



A. Myosin binds to ATP, but it is not actin and hydrolysis occurs.

B. Myosin has become available bind to Actin through calcium ions which allows the formation of a cross bridge between actin and myosin

C. After binding to actin, the myosin protein ADP +Pi releases the inorganic phosphate … "**the powerstroke**," pulling the actin thin filament toward the M line results

D. After the power stroke is completed, the myosin protein releases ADP. In this state, it remains stuck to the actin filament until it binds another ATP molecule.

Myofibril Contraction Control

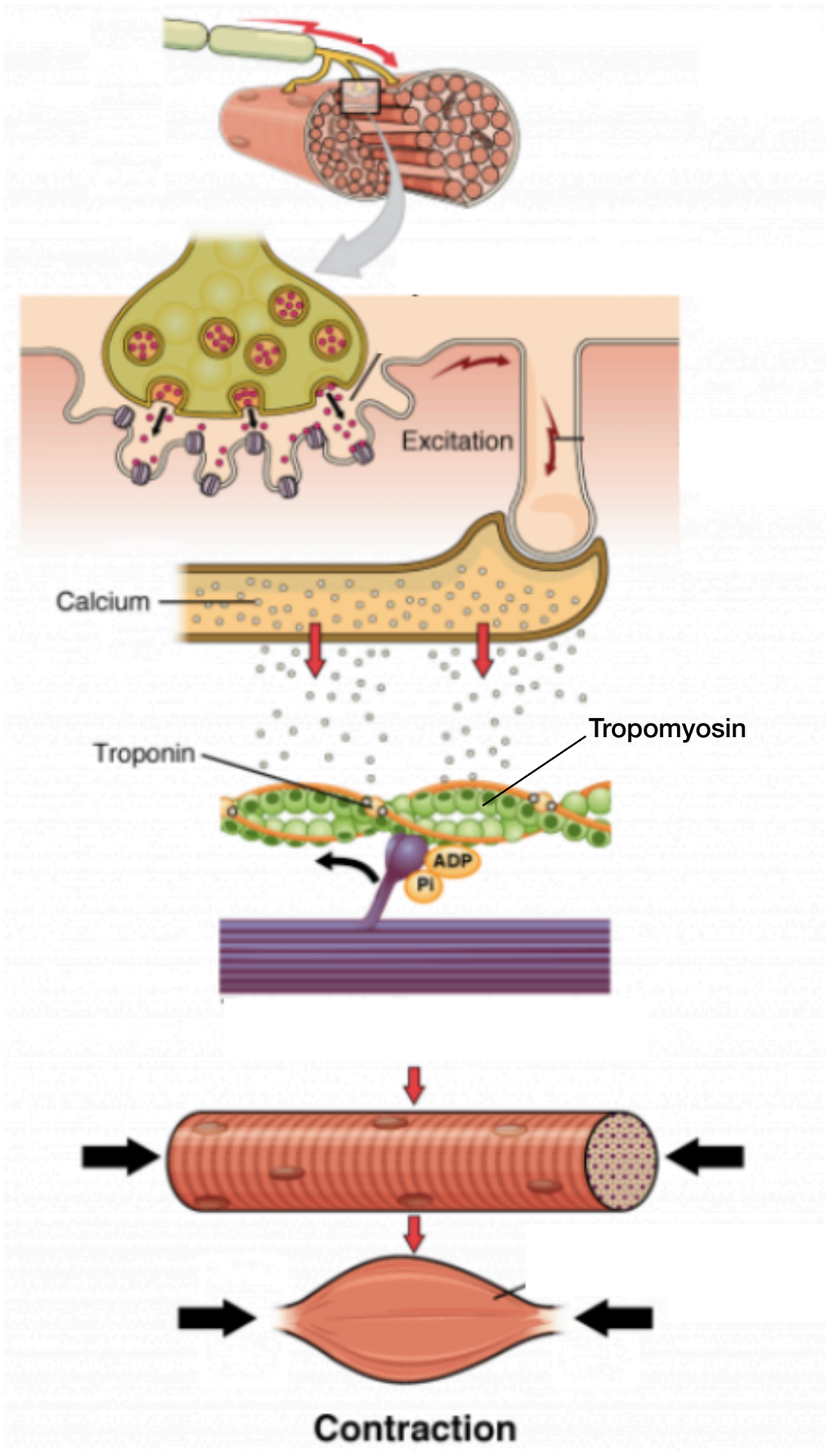
A. Neuron stimulated the muscle fibre

B. Sarcoplasmic reticulum releases calcium ions

C. Calcium binds to troponin

D. Troponin changes its shape and causes the movement of tropomyosin

E. Myosin protein forms a cross bridge with actin protein



Assignment

- Read about the use of fluorescence to study contraction. page 484

    - State two benefits of this technique

    - Hypothesis how scientist were able to determine the dependance of ATP on contraction

- Complete the question # 4 on page 511-512.